Air Dispersion Modeling Protocol
for 200 TPH Crusher and Screening Facility
Company Name
Facility Name

Introduction

Purpose of Modeling

This modeling analysis is being conducted to support an application for a modification to an NSR permit. The facility currently operates under NSR permit number *0000M0*. This application seeks to demonstrate compliance with the New Mexico Ambient Air Quality Standards (NMAAQS) and the National Ambient Air Quality Standards (NAAQS) as well as the PSD Standards because the facility is located in the Air Quality Control Region *XYZ* where the PSD minor source baseline data has been triggered for NOx and PM_{10}. A setback distance will be determined that is the minimum distance between any piles or equipment and the fence that restricts access to the public within the boundary, upon relocation at a new site in the future.

Facility Identification and Location

Name of Consulting Company will conduct a modeling analysis on behalf of *Company Name* for *Facility Name*, located approximately *00* miles northeast of *nearest town or land mark*, *XYZ* County New Mexico. The UTM Coordinates of the facility are *UTM 000,000 meters* East and *UTM 0,000,000 meters* North with NAD83 datum.

Facility Description

The facility is a portable fugitive source. The facility consists of one custom-built vibrating grizzly feeder, one *0*" x *0*" Denver jaw crusher, one Symons cone crusher, one *0*' X *0*' Simplicity 3 deck screen, one Denver *0*' x *0*' Ball Mill, one custom-built single deck vibrating screen, *0* transfer conveyors and a *000* kW Caterpillar diesel fired generator.

Modification Description

The facility proposes to increase operating hours from *0* hours per day to *00* hours per day. The modification results in emissions increase of NOx, TSP, and PM_{10}.

Model Selection

Dispersion modeling for the facility will be performed with the ISCST3 model for TSP, PM_{10}, and generator combustion emissions. If it exceeds TSP or PM_{10} standards, dry plume depletion model will be used for refined analysis. The following paragraphs outline our proposed approach in detail.

Emission Sources Modeled

Hours of Operation

The analysis will be conducted using scenarios designed to represent worst-case daily and annual operations at the facility. Daily operations will be modeled for a 12-hour workday starting at 07:00 hours and ending at 17:00 hours.

Source Type Information

Crushing and screening emissions will be modeled using volume sources. Sigma-y will be calculated assuming an initial horizontal dimension of four meters. Sigma-z will be calculated assuming an initial vertical dimension of four meters. An initial release height of two meters will be assumed. Conveyor transfer emissions will be added to the crushing and screening emission sources with which they are associated.

Stacker emissions will be modeled using volume sources. Sigma-y will be calculated assuming an initial horizontal dimension of four meters. Sigma-z will be calculated assuming an initial vertical dimension of ten meters. An initial release height of seven meters (2 meters plus half the initial vertical height) will be assumed. Disturbed ground and storage piles emissions will be modeled as area sources. Initial vertical dimensions of five meters will be assumed. The release heights will be set at 2.5 meters. Material handling emissions (loading into and from trucks) will be included with the storage pile area sources, as material loading will take place in the area surrounding the storage piles.

Haul road emissions will be modeled using volume sources. The road will be characterized as a series of adjacent squares fourteen meters to a side (representing an 8-meter road width plus 6 meters to account for mechanical turbulence), and volume sources will be located at the center of every square. Sigma-y will be calculated from the center-to-center distance of 14 meters. Sigma-z will be calculated assuming an initial vertical dimension of 6 meters. An initial release height of 3 meters will be assumed. Generator engine emissions will be modeled as point sources.

1. Model Input Options

We will use the latest version of ISCST3 dispersion model for this analysis. The model will be run in Non-regulatory Default mode for most conservative modeling results which specifies the use of the following options:

- Stack-tip downwash – Enabled for combustion emissions – reduces effective stack height when plume exit velocity is less than 1.5 times the wind speed. Disabled for particulate models.
- Plume buoyancy induced dispersion enabled – Increase the dispersion coefficient to account for the vertical movement of the plume.
- Include calm hours.
- Default wind profile exponents.
- Default vertical potential temperature gradients.
- Gradual plume rise.
- Allow missing met data.
- No building downwash – No buildings exist in close enough proximity to point sources to cause buildling downwash.
- Rural dispersion coefficients - because land use within the area circumscribed by a three km radius around the facility is greater than 50 percent rural.
- Flat terrain – topography surrounding the facility has substantially flat terrain.
- No flagpole option – receptor elevations are evaluated at ground level.

2. Receptor Grid Description

For each pollutant, the radius of significant impact around the facility is established using a Cartesian grid. A 50-meter grid spacing is used for the facility boundary receptors. A 100-meter spacing is extended out to 1-km from the facility boundary in each direction for a very fine grid resolution. Receptors for a fine grid resolution are placed with 250-meter spacing to a distance of 2.5-km from the facility boundary. For intermediate and rough grid resolutions, 500-meter spacing and 1000-meter spacing are extended to 5-km and 10-km beyond the facility boundary, respectively. The elevations of facility sources, receptors and surrounding sources will be determined using the **same method** and most recent 7.5 minute DEM data currently available.

3. Meteorological Data

We will use the one-year Empire Abo met data set with plume depletion parameters, EMPABOd.IS2, collected from 1993-1994 and available on the NMED website. We feel that met station is located at a comparable terrain not far from the facility. Therefore, this data is representative of meteorological conditions at the facility.

4. Radius of Impact (ROI) Analysis and Cumulative Impact Analysis (CIA)

We will conduct a significant impact analysis for each pollutant's emissions from the facility sources. If an air pollutant discharged by the facility results in an ambient impact greater than significance levels in the NMED/AQB Modeling Guidelines, the maximum extent of the significant impact area will be determined (as measured from the center of the facility to the furthest extent of the significant impact). The maximum extent will become a Radius of Impact (ROI). The area within the ROI then becomes the modeling domain for the CIA. The CIA will include impacts from the facility sources, any sources within 50 km plus the ROI or 65 km of the facility (whichever is greater), and an appropriate TSP/PM_{10} background concentration representative of natural sources. An inventory of the surrounding sources will be obtained from the MergeMaster regional sources database available on the NMED website. If the initial CIA modeling results for TSP and PM_{10} exceed the State and Federal standards with ISCST3 model, TSP and PM_{10} impacts will be calculated with the dry plume depletion model for all receptors that exceed air quality standards from the initial model. The following table shows the particle deposition parameters for TSP and PM_{10} that will be used in the modeling.

Note that this table is an example of reasonable aggregate handling depletion parameters

Size Range (μm)	Mass Mean Diameter (μm)	Mass Fraction	Density (g/cm^3)
	TSP		
0-2.5	1.57	0.03	2.5
2.5-5	3.88	0.1	2.5
5-10	7.77	0.24	2.5
10-20	15.54	0.38	2.5
20-30	25.33	0.25	2.5
	PM_{10}		

0-2.5	1.57	0.078	2.5
2.5-5	3.88	0.27	2.5
5-10	7.77	0.652	2.5

5. PSD Increment Analysis

If the results of the ROI for NOx and PM_{10} show exceedance of the significance levels, PSD increment analysis will be conducted because the minor source baseline date has been established in the region. The PSD analysis will be conducted including all PSD increment consuming sources in the surrounding sources within 50 km plus the ROI or 65 km of the facility (whichever is greater). Unlike the CIA, a predicted maximum PM_{10} concentration will be compared with the PSD standard without considering the PM_{10} background concentration.

6. Class I Areas Analysis

The modeling of impacts at nearby Class I areas will be included in the analysis, as there are two Class I areas located within 50 kilometers of the plant: White Mountain Wilderness Area and Bosque del Apache.

7. Setback Distance Analysis

The facility is a portable source so that a setback distance is required to ensure that the facility will not violate any air quality standards if it moves to a new location. Relocation modeling will be performed as follows:

- Particulate matter will be modeled using dry plume depletion to determine the setback distance.
- *00* µg/m^3 PM_{10} background and *00* µg/m^3 TSP background concentration representative of the area where the facility is located will be added to predicted concentrations.
- Grid spacing of *00* meters will be used.
- *XYZ* met data will be used for relocation modeling.
- Haul roads and surrounding sources will be omitted for relocation modeling.

An isopleth connecting all the receptors that exceed 90% of air quality standards will be drawn. From each point on the isopleth line, the distance to the nearest source (excluding haul road sources) will be determined. The setback distance is the largest of these distances. Setback distance will be rounded up to the nearest 10 meters that is above the calculated value.